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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,553	02/13/2004	Thomas L. Carroll	84,755	9518

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Associate Counsel (Patents), Code 1008.2
Naval Research Laboratory
Washington, DC 20375-5000

EXAMINER	
TIMORY, KABIR A	
ART UNIT	**PAPER NUMBER**
2609	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/03/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/779,553	Applicant(s) CARROLL, THOMAS L.	
	Examiner Kabir A. Timory	Art Unit 2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 February 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/13/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the summing in claim 2, line 2 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

1. The abstract of the disclosure is objected to because it exceeds 150 words. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-3 , 5, 9-11, 13, 17, and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Waldman et al. (US Patent Number 4,942,467).

Regarding claim 1:

As shown in figure 1, Waldman et al. discloses a communications method comprising:

- providing (i) a first signal having a positive entropy (curves 402-404 shows the entropy of the signal) (figure 4b, 402-404) and (ii) a plurality of delayed versions of the first signal (figure 5, 500, 504, 508), each delayed version of the plurality of delayed versions comprising a plurality of available values (figure 5, 500, 504);
- encoding data comprising a symbol by representing the symbol as a plurality of delay values, wherein each of said plurality of delay values comprises an available

value of the plurality of available values for each delayed version of the plurality of delayed versions (symbol encoder of figure 2, 20' which generates symbols) (figure 2, 202, 20, column 6, lines 5-12); and

- transmitting the encoded data across a communications channel (transmission channel is interpreted to be communication channel) (figure 1, 31).

Regarding claim 2:

Waldman et al. further discloses:

- summing the first signal having positive entropy and the plurality of delayed versions of the first signal, the plurality of delayed versions of the first signal comprising the plurality of delay values for the symbol (figure 5, 512).

Regarding claim 3:

Waldman et al. further discloses:

- decoding the encoded data by identifying each transmitted, delayed version of the plurality of delayed versions of the first signal (figure 2, 206, column 6, lines 5-12); and
- determining a transmitted delay value of the plurality of delay values for each identified delayed version (figure 5, 500, 504, 508).

Regarding claim 5:

Waldman et al. further discloses:

- generating a second signal substantially similar to the first signal, summing the second signal and a plurality of reference delays (figure 5, 500, 504); and

- maximizing a cross-correlation between the encoded data and the sum of the second signal and the plurality of reference delays (figure 5, 502, 506, column 10. lines 19-22).

Regarding claim 9:

As shown in figure 1, Waldman et al. further discloses a communication apparatus comprising:

- means for providing (i) a first signal having a positive entropy (figure 4b, 402-404) and (ii) a plurality of delayed versions of the first signal, each delayed version of the plurality of delayed versions comprising a plurality of available values (figure 5, 500, 504, 508);
- means for encoding data comprising a symbol by representing the symbol as a plurality of delay values, wherein each of said plurality of delay values comprises an available value of the plurality of available values for each delayed version of the plurality of delayed versions (symbol encoder of figure 2, 20' which generates symbols) (figure 2, 202, 20, column 6, lines 5-12); and
- means for transmitting the encoded data across a communications channel (transmission channel is interpreted to be communication channel) (figure 1, 31).

Regarding claim 10:

Waldman et al. further discloses:

- means for summing the first signal having positive entropy and the plurality of delayed versions of the first signal, the plurality of delayed versions of the first signal comprising the plurality of delay values for the symbol (figure 5, 512).

Regarding claim 11:

Waldman et al. further discloses:

- means for decoding the encoded data by identifying each transmitted delayed version of the plurality of delayed versions of the first signal (figure 2, 206, column 6, lines 5-12); and
- means for determining a transmitted delay value of the plurality of delay values for each identified, delayed version (figure 5, 500, 504, 508).

Regarding claim 13:

Waldman et al. further discloses:

wherein said decoding means comprises:

- means for generating a second signal substantially similar to the first signal, means for summing the second signal and a plurality of reference delays (figure 5, 500, 504); and
- means for maximizing a cross-correlation between the encoded data and the sum of the second signal and the plurality of reference delays (figure 5, 502, 506, column 10. lines 19-22).

Regarding claim 17:

as shown in figure 1, Waldman et al. discloses a communications device comprising:

- a symbol encoder for receiving data comprising a symbol and for receiving a first signal having a positive entropy (symbol encoder of figure 2, 20' which generates symbols) (figure 2, 202, 20', column 6, lines 5-12), the symbol encoder adding to the

first signal a plurality of delayed versions of the first signal, each delayed version of the plurality of delayed versions comprising a plurality of available values, the symbol being represented by a set of delay values, a delay value of the set of delay values comprising an available value of the plurality of available values for the each delayed version of the plurality of delayed versions (figure 5, 500, 512); and

- a transmitter for receiving the encoded data from the symbol encoder and for transmitting the encoded data (statistical coder encodes symbol of a signal) (figure 6, 30, 604).

Regarding claim 20:

As shown in figure 1, Waldman et al. discloses a communications device for receiving encoded data, the communications device comprising:

- a receiver (figure 1, 32) for receiving a first signal having positive entropy added to a plurality of delayed versions of the first signal (curves 402-404 shows the entropy of the signal) (figure 4b, 402-404), each delayed version of the plurality of delayed versions comprising a plurality of available values, wherein encoded data comprises a symbol, the symbol being represented by a plurality of delay values (symbol encoder of figure 2, 20' generates symbols) (figure 2, 202, 20, column 6, lines 5-12), a delay value of the plurality of delay values comprising an available value of the plurality of available values for the each delayed version of the plurality of delayed versions (figure 5, 500, 504, 508); and

- a symbol decoder for receiving the encoded data from said receiver, the symbol decoder for summing a second signal, substantially similar to the first signal, and a plurality of reference delays, and
- for maximizing a cross-correlation between the encoded data and the sum of the second signal and the plurality of reference delays (figure 5, 502, 506, column 10. lines 19-22).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 4, 6,-8, 12, 14-16, 18, 21, 23-25, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldman et al. (US Patent Number 4,942,467) in view of Shattil et al. (US Pub. Number 2002/0034191)

Regarding claim 6, 8, 14, and 16:

Waldman et al. discloses all of the subject matter as described above except for specifically teaching compensating the plurality of reference delays for degradation by the communications channel of the plurality of delayed versions of the first signal.

However, Shattil et al in the same field of endeavor, teaches compensating the plurality of reference delays for degradation by the communications channel of the plurality of delayed versions of the first signal (paragraph 0387, lines 8-13).

One of ordinary skill in the art would have clearly recognized that to compensate delays for degradation, filtering and equalizing the combined signal is used. This process is part of signal processing techniques, which include filtering, equalizing, amplifying, attenuating, phase shifting, delaying, mixing, sampling, frequency shifting, translating to a different modulation format, interference cancellation, analog-to-digital conversion, integration, rectification, averaging, and/or decoding. To recover the original signal, it would have been obvious to one skill in the art at the time the invention was made to compensate for the delay as taught by Shattil et al. In doing so, we can recover the original signal and compensate the delay of the received signal.

Regarding claim 7 and 15:

Waldman et al. discloses:

Wherein decoding step comprises generating a weighted third signal substantially similar to the first signal, summing the weighted third signal and a plurality of weighted reference delays (figure 5, 508, 510).

Waldman et al. discloses all of the subject matter as described above except for specifically teaching performing a least squares fit between the encoded data and the sum of the third signal and the plurality of weighted reference delays.

However, Shattil et al in the same field of endeavor, teaches performing a least squares fit between the encoded data and the sum of the third signal and the plurality of

weighted reference delays (minimum mean square is interpreted to be least squares fit) (figure 68).

One of ordinary skill in the art would have clearly recognized that the best fitting curve to a given set of points a mathematical procedure such as Minimum Mean Square or Least Squares Fit is used by minimizing the sum of the squares of the offsets of the points from the curve. The sum of the squares of the offsets is used instead of the offset absolute values because this allows the residuals to be treated as a continuous differentiable quantity. To minimize the expectation of the squared residual, it would have been obvious to one skill in the art at the time the invention was made to use minimum mean square or least squares fit as taught by Shattil et al. In doing so, we can find the best fitting curve by minimizing the sum of the squares of the offsets or residuals of the points from the curve.

Regarding claim 4, 12, 18, 21 and 25:

Waldman et al. discloses all of the subject matter as described above except for specifically teaching the first signal comprises one of a chaotic signal, a noise signal, and a positive entropy, baseband signal modulated onto a positive entropy signal having a higher frequency than the baseband signal.

However, Shattil et al in the same field of endeavor, teaches the first signal comprises one of a chaotic signal, a noise signal, and a positive entropy, baseband signal (paragraph 0261) modulated onto a positive entropy signal having a higher frequency than the baseband signal (paragraph 0545).

One of ordinary skill in the art would have clearly recognized that any type of time-domain signal having a finite duration including, but not limited to, a pulse, a monocycle, a rectangle waveform, a step function, a triangle waveform, a Gaussian waveform, a sinusoidal waveform, a sinc waveform, an exponential waveform, a parabolic waveform, a hyperbolic waveform, a noise waveform, a chaotic signal waveform, a baseband signal, any type of impulse, and a portion of any type of periodic signal. In order to send or receive signal via a communication channel, it would have been obvious to one skill in the art at the time the invention was made to use any type of signal which contains information such as noise signal, baseband signal, or chaotic signal as taught by Shattil. In doing so, we can send and receive information via a communication link. Also, we can modulate these signal using any type of modulation technique such as: FM, AM, FSK, PSK, PM and so on.

Regarding claim 23 and 27:

Waldman et al. further discloses a receiver and with said symbol decoder (figure 2, 32, 206).

Waldman et al. discloses all of the subject matter as described above except for specifically teaching the communications device further comprising an equalizer.

However, Shattil et al in the same field of endeavor, teaches an equalizer (paragraph 0265, line 14).

One of ordinary skill in the art would have clearly recognized that in order to compensate for the unequal frequency response of some other signal processing circuit or system an equalizer is used. An equalizer filter typically allows the user to adjust one

or more parameters that determine the overall shape of the filter's transfer function. To adjust the signal level and output, it would have been obvious to one skill in the art at the time the invention was made to use an equalizer in the system as taught by Shattil. An equalizer is generally used to improve the fidelity of sound, to emphasize certain instruments, to remove undesired noises, or to create completely new and different sounds.

Regarding claim 24:

As shown in figure 1, Waldman et al. discloses a communications device for receiving encoded data, the communications device comprising:

- a receiver for receiving a first signal having positive entropy (figure 1, 32) added to a plurality of delayed versions of the first signal (figure 5, 500, 504, 508), each delayed version of the plurality of delayed versions comprising a plurality of available values, wherein encoded data comprises a symbol, the symbol being represented by a plurality of delay values (symbol encoder of figure 2, 20' generates symbols) (figure 2, 202, 20, column 6, lines 5-12), a delay value of the plurality of delay values comprising an available value of the plurality of available values for the each delayed version of the plurality of delayed versions (figure 5, 500, 504, 508); and
- a symbol decoder for receiving the encoded data from said receiver (figure 2, 206), the symbol decoder for summing a third signal, being a weighted version of the first signal, and a plurality of weighted reference delays (figure 5, 512).

Waldman et al. discloses all of the subject matter as described above except for specifically teaching performing a least squares fit between the encoded data and the sum of the third signal and the plurality of weighted reference delays.

However, Shattil et al in the same field of endeavor, teaches performing a least squares fit between the encoded data and the sum of the third signal and the plurality of weighted reference delays (minimum mean square is interpreted to be least squares fit) (figure 68).

One of ordinary skill in the art would have clearly recognized that the best fitting curve to a given set of points a mathematical procedure such as Minimum Mean Square or Least Squares Fit is used by minimizing the sum of the squares of the offsets of the points from the curve. The sum of the squares of the offsets is used instead of the offset absolute values because this allows the residuals to be treated as a continuous differentiable quantity. To minimize the expectation of the squared residual, it would have been obvious to one skill in the art at the time the invention was made to use minimum mean square or least squares fit as taught by Shattil et al. In doing so, we can find the best fitting curve by minimizing the sum of the squares of the offsets or residuals of the points from the curve.

6. Claims 19, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Waldman et al. and Shattil et al. as applied to claims18, 21 and 25 above, and further in view of admitted art (paragraph 10, page 16).

Waldman et al. and Shattil et al. discloses all of the subject matter as described above except for specifically teaching the chaotic signal comprises one of a Lorenz system-generated chaotic signal and a Rossler system-generated chaotic signal.

However the admitted prior art discloses the chaotic signal comprises one of a Lorenz system-generated chaotic signal and a Rossler system-generated chaotic signal.

One of ordinary skill in the art would have clearly recognized that the chaotic signal has a broadband spectrum. This property implies that the chaotic signal can be used as random excitation in order to measure the frequency response of a system. To measure the frequency and impulse response of a linear system, it would have been obvious to one skill in the art at the time the invention was made to use chaotic signal as taught by Rossler. It is advantageous to use chaotic signal because high power level can be generated with simple circuit configuration.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Miller et al. (US Patent Number 6,735,264) discloses a compensation for non-linear distortion in a modem receiver, Craven et al. (US Patent Number 6,784,812) discloses a lossless coding method for waveform data, and Goodwin et al. (US Pub Number 2003/0093282) discloses an efficient system and method for converting between different transform-domain signal representations.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kabir A. Timory whose telephone number is (571) 270-1674. The examiner can normally be reached on Mon - Thu 6:30AM - 4:00PM & Fri 6:30AM - 3:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shuwang Liu can be reached on (571) 272-3036. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kabir Timory
March 27, 2007

Shuwang Liu

SHUWANG LIU
SUPERVISORY PATENT EXAMINER